

sponses by many nudibranchs, and occasionally capture and prey on them (FEDER, 1980; T. A. Wayne, personal communication; personal observations). Attacks by these seastars on nudibranchs (and on potential competitors of the nudibranchs) could be an additional factor maintaining the high diversity of nudibranchs at Boardman (e.g., see PAINE, 1966; HUSTON, 1979).

Two opisthobranch species known from Cape Arago but conspicuously absent from Boardman are *Archidoris odhneri* and *Berthella californica*. At Cape Arago both species are most often observed among submerged boulders kept relatively barren of foliose algae by sea urchins, limpets, and chitons (GODDARD, 1984, and unpublished observations). The nature of this association is unknown, but this type of habitat is essentially nonexistent at Boardman, where seastars and other predators presumably suppress low-intertidal populations of herbivorous grazers.

Sixty-five percent (11/17) of the species of nudibranchs found at Humbug Mountain were predators of hydroids. This compares to 44 and 47% for Boardman and Cape Blanco respectively, where sponge- and bryozoan-feeding nudibranchs tended to be more common. Greater exposure of the boulders at Humbug Mountain to shifting sands, resulting in under-rock communities of hydroids and other early successional (or sand-resistant) species, probably explains the higher proportion of hydroid-feeding nudibranchs observed there (see MCGUINNESS, 1987; BOERO, 1984; also SOUSA, 1979).

Hermisenda crassicornis was abundant at all three sites. All but two specimens (from Humbug Mountain) were of the variety possessing a bluish-white, longitudinal stripe on each cerata (see BEHRENS, 1980:93, lower photograph; McDONALD, 1983:201–202).

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Temporary Northern Range Extension of the Squid *Loligo opalescens* in Southeast Alaska

by

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Abstract. This note reports a temporary northern extension of the range of the California market squid, *Loligo opalescens* Berry, 1911, to 58°N in Southeast Alaska and suggests that water temperatures influence the northern limits of this neritic squid.

The reported range of *Loligo opalescens*, Berry, 1911, the only loliginid in the northeastern Pacific, is from Baja California (28°N) to southern Southeast Alaska (55°N) (BERNARD, 1970; HIXON, 1983). Although the main commercial harvest comes from California, small commercial fisheries exist in Baja California, Oregon, and Washington (ROPER *et al.*, 1984). Potentially, commercial stocks exist in British Columbia (BERNARD, 1980) and Southeast Alaska (STREET, 1983).

Reports of *Loligo opalescens* in Southeast Alaska are sparse. REID (1961) found *L. opalescens* in the stomachs of chinook (*Oncorhynchus tshawytscha* Walbaum, 1792) and coho (*O. kisutch* Walbaum, 1792) salmon from Southeast Alaska in 1957-1958. *Loligo opalescens* was not subsequently reported in Alaska until 1980, prompting exploratory fishing around Prince of Wales Island in 1982 (STREET, 1983). During 1982, *L. opalescens* was found in stomachs of troll-caught salmon off the west coasts of Baranof and Yakobi islands (KARINEN *et al.*, 1985; WING, 1985).

Loligo opalescens was collected north of latitude 55°N on several occasions from 1982 through 1984 during research projects of the Auke Bay Laboratory and from stomachs of salmon caught by participants of the Alaska Troll Logbook Program (Figure 1, Table 1). The collections from Yakobi Island (58°N) are the most northerly

records for this species; the trawl catch west of the Myriad Islands (57°N) is the most northerly evidence of schooling; and the collection of egg capsules at Rowan Bay (56°N) is the most northerly observation of spawning.

The trawl catch of *Loligo opalescens* from west of the Myriad Islands is of interest because the number of specimens captured (>230) indicates that the sample was from a large school. These squid were classified as mature or immature (Table 2), based on the presence or absence of eggs or sperm (FIELDS, 1965); ca. 94% of the females had maturing ovaries and 61% of the males had spermatophores. Mantle lengths (ML) averaged 78.4 mm and 83.7 mm for males and females, respectively. These squid were captured at 126 m and at a bottom water temperature of 6.9°C.

Loligo opalescens spawns at water temperatures from 7°C (BERNARD, 1980) to 16°C (FIELDS, 1965). Water temperatures above 7°C occur in the southern portion of Southeast Alaska from March to December, with maximum temperatures of 13-16°C occurring in July and August (WILLIAMSON, 1965; JONES, 1978). Spawning is sporadic from December through September in British Columbia (BERNARD, 1980). Although *L. opalescens* spawns regularly in Barkley Sound (SHIMEK *et al.*, 1984), spawning may not occur annually at other British Columbia locations